

CLAIMS

We claim:

1. A building automation system comprising:
a plurality of programmable user interface units, each of said user interface
5 units located in a room or associated area of a building;
a plurality of power drivers, each of said power drivers located in a room or
associated area of said building;
a controller comprising a processor and a memory; and
an electrical signal trunk connected to said controller;
10 wherein each of said user interface units and each of said power drivers are
connected to said electrical signal trunk.
2. A building automation system as in claim 1 wherein said user
interface units include a touchscreen.
3. A building automation system as in claim 1 wherein each of said user
15 interface units is capable of controlling each of said power drivers.
4. A building automation system as in claim 1 and further including an
electrical circuit panel and an electrical power conductor connected between said
electrical circuit panel and each of said power drivers.
5. A building automation system as in claim 1 wherein said electrical
20 signal trunk is a low voltage control wiring.
6. A building automation system as in claim 5 wherein said low voltage
control wiring is CAT5 cable.
7. A building automation system as in claim 1 and further including a
plurality of electrical devices, each of said electrical devices electrically connected
25 to one of said power drivers, said electrical devices comprising a plurality of
different types of devices selected from the group consisting of lighting fixtures,
fans, security systems, audio/video systems, heating systems, air conditioning
systems, garage doors, garage door sensors, doorbells, window controls, sprinkler
controls, garage door openers, electronic gate openers, driveway heaters, sidewalk
30 heaters, fireplace controls, intercoms, speakers, microphones, dampers, digital
cameras, hot water heaters, telephones, aquarium controls, water feature controls,
pool/spa controls, fire protection systems, thermostats, and switched outlets.

8. A building automation system as in claim 2 wherein said user interface units include a button separate from said touchscreen, said button adapted to control an electrical device in the room or associated area in which said user interface unit is located.

5 9. A building automation system as in claim 8 wherein said electrical device is a lighting fixture.

10. A building automation system as in claim 8 and further including a light for illuminating said button.

10 11. A building automation system as in claim 1 and further including a wireless remote control, wherein said wireless remote control controls only the electrical devices in the room in which it is located.

12. A building automation system as in claim 11 wherein said wireless remote control further includes a selector button, wherein operating said selector button changes the electrical device controlled by said wireless remote control.

15 13. A building automation system as in claim 12 wherein said wireless remote control further includes up/down buttons, wherein selecting the up/down buttons adjusts the electrical output to said selected electrical device.

14. A building automation system as in claim 11 wherein said wireless remote control further includes a flashlight and a flashlight activation button.

20 15. A building automation system as in claim 11 wherein said wireless remote control controls electrical devices throughout said building.

16. A building automation system as in claim 11 wherein said wireless remote control transmits radio frequency (RF) signals.

25 17. A building automation system as in claim 11 wherein said wireless remote control transmits infrared (IR) signals.

18. A building automation system as in claim 1 wherein each of said power drivers control AC power to a plurality of electrical devices.

30 19. A building automation system as in claim 2 wherein said touchscreen displays a scene screen object for controlling a plurality of said electrical devices with a single touch.

20. A building automation system as in claim 2 wherein said touchscreen displays a program screen object enabling the user to program any controllable

electrical device in said building or associated areas.

21. A building automation system as in claim 2 wherein said touchscreen displays screen objects for accessing three or more functions selected from the group consisting of: time, date, temperature, weather, security, intercom, audio, and sprinklers.

22. A building automation system as in claim 1 wherein said user interfaces include a level control for controlling the level of power applied to an electrical device.

23. A building automation system as in claim 22 wherein said level control includes a bar graph device for indicating the power level at which said level control is set.

24. A building automation system as in claim 22 wherein said electrical device is selected from the group consisting of a lighting fixture and a motor.

25. A building automation system as in claim 2 wherein said touchscreen displays a rooms screen object for displaying a listing of said rooms and associated areas of said building.

26. A building automation system as in claim 2 wherein said touchscreen displays a screen object for displaying a list of all controllable electrical devices in said rooms and associated areas of said building.

27. A building automation system comprising:
a controller comprising a microprocessor and a memory;
a plurality of programmable user interface units, each of said user interface units located in a room in a building;

each user interface unit comprising: a touchscreen, a speaker, and a microphone;

each user interface unit is capable of controlling an electrical device in a room in which said controller is located; and

each user interface unit is capable of controlling an electrical device in a room different than the room in which said controller is located.

28. A building automation system as in claim 27 wherein each user interface unit further includes a camera.

29. A building automation system as in claim 27 wherein each user

interface unit further includes a motion detector.

30. A building automation system as in claim 27 wherein at least one user interface unit receives radio frequency (RF) signals.

5 31. A building automation system as in claim 27 wherein at least one user interface unit receives infrared (IR) signals.

32. A building automation system as in claim 27 wherein each user interface unit is connected to said controller via the same electrical signal trunk.

33. A building automation system comprising:
a plurality of programmable user interface units, each of said user interface
10 units located in a different room in a building; and

each user interface unit is capable of controlling three or more appliances selected from the group consisting of lighting fixtures, fans, security systems, audio/video systems, heating systems, air conditioning systems, garage doors, doorbells, window controls, sprinkler controls, garage door openers, electronic gate
15 openers, driveway heaters, sidewalk heaters, fireplace controls, intercoms, speakers, microphones, dampers, digital cameras, hot water heaters, telephones, aquarium controls, water feature controls, pool/spa controls, fire protection systems, thermostats, and switched outlets.

34. An electrical appliance control system as in claim 33 wherein each
20 user interface unit further comprises: a touch screen; a speaker; and a microphone.

35. An electrical appliance control system as in claim 33 wherein each user interface unit further comprises an occupancy sensor.

36. An electrical appliance control system as in claim 33 wherein each
25 user interface unit further comprises a camera.

37. A user interface unit for a building automation system, said user interface unit comprising: a touch screen; a speaker; a microphone; and control electronics capable of controlling three or more appliances selected from the group consisting of lights, fans, security systems, audio systems, heating systems, air
30 conditioning systems, garage doors, doorbells, window controls, sprinklers, fireplaces, intercoms, and thermostats.

38. An electrical appliance control system as in claim 37 wherein each

user interface unit further comprises an occupancy sensor.

39. An electrical appliance control system as in claim 37 wherein each user interface unit further comprises a camera.

40. A user interface unit for controlling an appliance in a selected room in a building, said user interface unit comprising:

a graphical display;

a memory for storing a plurality of displays to be displayed on said graphical display, said plurality of displays including a selected room display suitable for controlling said appliance in said selected room and at least one display suitable for controlling an electrical appliance in a room different than said selected room;

a room button on said user interface unit; and

a processor responsive to said room button for displaying said selected room display.

41. A user interface unit as in claim 40 wherein said selected room is the room in which said user interface unit is located.

42. A user interface unit as in claim 40 wherein said button is on said graphical display.

43. A user interface unit as in claim 42 wherein said display is a touchscreen.

44. A method of controlling a selected electrical appliance located in a first room in a building, said method comprising:

pressing a program screen object on a touchscreen user interface unit located in a second room different than said first room;

responsive to said pressing, displaying on said touchscreen user interface unit a list of a plurality of appliances in said building and an indication of which room in said building in which each of said appliances is located;

touching said screen to select said selected appliance from said list,

responsive to said selecting, displaying on said touchscreen a list of attributes of said selected appliance; and

programming said attributes.

45. A method as in claim 44 and further including automatically arranging buttons showing said attributes on said screen.

46. A method as in claim 44 and further including, after said programming, touching a room screen object on said screen, and responsive to touching said room key, displaying a screen including a control button for an appliance in said second room.

5 47. A method as in claim 44 wherein said list of appliances includes two or more appliances selected from the group consisting of lighting fixtures, fans, security systems, audio/video systems, heating systems, air conditioning systems, garage doors, doorbells, window controls, sprinkler controls, garage door openers, electronic gate openers, driveway heaters, sidewalk heaters, fireplace controls, 10 intercoms, speakers, microphones, dampers, digital cameras, hot water heaters, telephones, aquarium controls, water feature controls, pool/spa controls, fire protection systems, thermostats, and switched outlets.

48. A product for controlling a selected electrical appliance located in a first room in a building, said product comprising:

15 instructions for directing a processing unit to:
 display a program screen object;
 receive an input that said program screen object has been activated;
 responsive to said input, display a list of a plurality of appliances in said building and an indication of which room in said building in which each 20 of said appliances is located;
 receive an input identifying a selected appliance on said list;
 display a list of attributes of said selected appliance;
 receive a value for a selected attribute; and
 communicate a signal for setting said selected attribute of said 25 selected appliance in accordance with said value; and
 a media readable by said processing unit that stores said instructions.

49. A method of controlling at least three different appliances in a building having at least three rooms, each of said three appliances being in a different one of said rooms, said method comprising:

30 entering any one of said three rooms; and
 operating a touchscreen control panel in said entered room to control any one of said three appliances.

50. A method as in claim 49 wherein said operating comprises:
selecting a screen object corresponding to a selected appliance; and
utilizing said selected screen object to control said selected appliance.

51. A method of programming a building automation system comprising:
5 a plurality of programmable user interface units, each user interface unit
located in a different room of a building;

a controller; and

an electrical signal trunk connecting said controller and said user interface
units; said method comprising:

10 electrically connecting a non-volatile memory unit storing a program
to said controller;

said controller recognizing that said non-volatile memory contains a
program appropriate for programming said control system; and

said controller uploading said program into each of said user interface
15 units.

52. A method as in claim 51 wherein said recognizing comprises:

said controller recognizing that said programmable appliance user interface
units do not contain a program; and

said controller recognizing that said non-volatile memory unit stores a
20 program appropriate for said user interface units.

53. A method as in claim 51 wherein:

said recognizing comprises said controller recognizing that said non-volatile
memory unit stores an update to a program stored in said user interface units; and

said uploading comprises said controller updating said program in said user
25 interface units.

54. A method as in claim 51 wherein said electrically connecting
comprises engaging a plug/socket connected to said non-volatile memory with a
plug/socket connected to said controller.

55. A method of backing up a building automation system comprising:

30 a plurality of programmable appliance user interface units, each user
interface unit located in a different room of a building;

a controller; and

an electrical signal trunk connecting said controller and said user interface units; said method comprising:

electrically connecting a non-volatile memory unit storing to said controller;

5 said controller recognizing that said non-volatile memory is blank; and
 said controller downloading data from said user interface units to said non-volatile memory.

56. A method as in claim 55 wherein said electrically connecting comprises engaging a plug/socket connected to said non-volatile memory with a
10 plug/socket connected to said controller.

57. A method of installing a building automation system in a building having a circuit panel including a plurality of electrical power lines, a first electrical device installed in a first room in said building, a second electrical device installed in a second room in said building, said method comprising:

15 installing a first user interface unit in said first room and a second user interface unit in said second room;

 electrically connecting said first user interface unit and said second user interface unit to a controller having a CPU and a memory;

 electrically connecting said first electrical device to a first power driver and
20 said second electrical device to a second power driver;

 electrically connecting said first user interface unit to said first power driver and said second user interface unit to said second power driver; and

 using said plurality electrical power lines to supply power to said first power driver and said second power driver.

25 58. A method of programming a building automation system comprising:
 providing a first building automation system in a first building;
 programming said first building automation system;
 providing a second building automation system in a second building; and
 copying said programming of said first building automation system to said
30 second building automation system.

59. A method as in claim 58 wherein said copying comprises copying said programming of said first building automation system to a removable medium;

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transporting said removable medium to said second building; and copying said programming of said first building automation system from said removable medium to said second building automation system.

60. A slave device for use in a building automation system, said slave
5 device comprising:

a memory;

a processor;

a signal input/output for connecting said processor to an electrical signal
trunk;

10 a touchscreen display; and

a room button separate from said touchscreen display for controlling an
electrical device.

61. A slave device for use in a building automation system, said slave
device comprising:

15 a memory;

a processor;

a signal input/output for connecting said processor to an electrical signal
trunk;

a touchscreen display; and

20 software or firmware stored in said memory for causing said touchscreen to
display a screen object for listing the electrically controllable devices in the rooms
and associated areas in said building.

62. A slave device for use in a building automation system, said slave
device comprising:

25 a memory;

a processor;

a signal input/output for connecting said processor to an electrical signal
trunk;

a touchscreen display; and

30 software or firmware stored in said memory for causing said touchscreen to
display a screen object for listing the rooms and associated areas in said building.

63. A remote control device for use in a building automation system, said

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remote control device comprising:

a memory;

a processor;

a selector key for selecting a function to be controlled;

5 a display for displaying an indication of the function to be controlled; and

an up/down key for controlling said function.

64. A remote control device as in claim 63 and further including a flashlight.

10 65. A level control for use in a building automation system, said level control comprising:

a memory;

a processor;

a signal input/output for connecting said processor to an electrical signal trunk;

15 an infrared receiver; and

a level control indicator to indicate the level at which said level control is set.

66. A slave device for use in a building automation system, said slave device comprising:

a memory containing a protective code;

20 a processor;

a trunk output connected to said processor; and

software or firmware directing said processor to output said code on said trunk output in response to a predetermined signal received on said trunk.

25 67. A slave device as in claim 66 wherein said slave device is a device selected from the group consisting of a touchscreen user interface, a remote user interface, a level control device, and a power driver.

68. A method of doing business comprising:

licensing an electronic system technology to a licensee, said electronic system including an electronic slave device and an electronic controller;

30 assigning said licensee a protective code;

storing in said controller software or firmware instructing said controller to:

receive said protective code from said slave device; and

not recognize or communicate with said slave device if said code is not received.

69. A method as in claim 68 wherein said electronic system is a building automation system.

5 70. A method as in claim 68 wherein said process of receiving said protective code includes sending a message from said controller to said slave device and receiving said protective code in response to said message.

71. A method of enforcing copyright protection for software or firmware, said method comprising:

10 providing an electronic system including a system controller and a electronic device, said system controller including a processor and a memory, said electronic device including protectable software or firmware;

 said memory including instructions to cause said processor not to communicate with or recognize said device if said software or firmware does not
15 include a proper copyright notice.

72. A method as in claim 71 wherein said system requires a working address for said device to communicate with said controller, and said not communicating with or recognizing comprises not providing a working address to said device.

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